WHITE PAPER

USDA Forest Service Pacific Northwest Region Umatilla National Forest

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Vegetation Polygon Mapping And Classification Standards: Malheur, Umatilla, And Wallowa-Whitman National Forests[1]

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These mapping and classification standards pertain to delineation and interpretation of vegetation polygons for the Blue Mountain national forests (Malheur, Umatilla, and Wallowa-Whitman national forests). It is assumed that the mapper is using a mirror stereoscope and aerial photography to classify ***only the vegetation that can be seen***.

A 'polygon' is defined as a series of line segments that completely enclose a land area with enough homogeneity of vegetation and other characteristics to be distinguishable from its surroundings. Minimum polygon size is 1 acre for nonforest areas and 2 acres for forest areas.

As used here, 'polygon mapping' also refers to delineation of nonvegetated areas such as rock or water.

I. DELINEATION PROCEDURES.

Definitions. The following definitions are used on the Malheur, Umatilla, and Wallowa-Whitman national forests located in northeastern Oregon, southeastern Washington, and west-central Idaho. Polygon delineations shall occur in the same order of precedence as these definitions: water polygons first, nonvegetated polygons second, and so forth.

[1] White papers are internal reports; they receive only limited review. Viewpoints expressed in this paper are those of the author – they may not represent positions of the USDA Forest Service.

[2] These standards were developed collaboratively by all three Blue Mountain national forests. The 'master' version of this document is maintained by Dave Powell, Forest Silviculturist, Umatilla National Forest, Supervisor's Office; please contact him with any questions, corrections, or omissions.

A. Water – Rivers, streams, sloughs, and canals with an average width of 80 feet or more; and lakes, reservoirs, and ponds more than 1 acre in area.

B. Land – Dry land (including areas temporarily or partly covered by water such as marshes, swamps, and river floodplains); rivers, streams, sloughs, and canals with an average width of 80 feet or less; and lakes, reservoirs, and ponds less than 1 acre in area. Land is further classified as nonvegetated, nonforest, or forest.

1. Nonvegetated Land – Land areas with an average width of 80 feet or more and having these characteristics: less than 20% of the ground surface is vegetated (rock, ice, talus, etc.); or vegetated areas developed for administrative or agricultural use (buildings, structures, roads, pasture, orchards, developed recreation sites, etc.). Nonvegetated areas with an average width of less than 80 feet are not delineated as separate polygons. Nonvegetated land is mapped to a 1-acre minimum size.

2. Nonforest Land – Land areas with an average width of 80 feet or more and having these characteristics: not currently developed for nonvegetated purposes (buildings, administrative sites, etc.); 20% or more of the ground surface is vegetated; and current canopy cover of trees is less than 10%. Nonforest areas with an average width of less than 80 feet are not delineated as separate polygons. Nonforest land is mapped to a 1-acre minimum size. Note: recently deforested areas (clearcuts, wildfires, etc.) are classified as forest land (lifeform code CN or HN) even if tree canopy cover is currently less than 10%.

3. Forest Land – Land areas with an average width of 80 feet or more and having these characteristics: not currently developed for nonvegetated purposes (buildings, administrative sites, etc.); 20% or more of the ground surface is vegetated; and current canopy cover of trees is greater than or equal to 10%. Forest areas with an average width of less than 80 feet are not delineated as separate polygons. Forest land is mapped to a 2-acre minimum size. Nonstocked areas (wildfires, etc.) may be classed as forest even if tree cover is less than 10%.

C. Nonvegetated polygons. Nonvegetated polygons are delineated if:

a. Average polygon width is 80 feet or more.

b. Contiguous area being evaluated is 1 acre or more in size.

c. Vegetation canopy cover occupies less than 20% of the ground surface.

d. Area is developed for nonvegetated purposes (e.g., roads, administrative sites, etc.).

Note: If none of these criteria differ for two adjacent nonvegetated areas, they shall be delineated as a single polygon.

D. Nonforest polygons. Nonforest polygons are delineated if:

a. Average polygon width is 80 feet or more.

b. Contiguous area being evaluated is 1 acre or more in size.

c. Vegetation canopy cover occupies 20% or more of the ground surface.

d. Tree canopy cover is less than 10% (except for recently deforested areas).

e. Nonforest canopy cover (shrub, herb) changes by 15% or more from one portion of an area to another.

f. The number of canopy layers changes from one portion of an area to another.

g. The predominant species in a layer changes from one portion of an area to another.

Note: If none of these criteria differ for two adjacent nonforest areas, they shall be delineated as a single polygon.

E. Forest polygons. Forest polygons are delineated if:

a. Average polygon width is 80 feet or more.

b. Contiguous area being evaluated is 2 acres or more in size.

c. Vegetation canopy cover occupies 20% or more of the ground surface.

d. Tree canopy cover is 10% or more (except for recently deforested areas).

e. Tree canopy cover changes by 20% or more from one portion of an area to another.

f. The number of canopy layers changes from one portion of an area to another.

g. The predominant species in a layer changes from one portion of an area to another.

h. The size class of a layer changes from one portion of an area to another.

Note: If none of these criteria differ for two adjacent forest areas, they shall be delineated as a single polygon.

II. POLYGON INFORMATION.

A. Polygon Number (Stand_tag in EVG_Vegetation table; also used as Exam_ID for PI surveys). All polygons will be given unique numbers.

1. *The following applies to the Malheur National Forest only*. A complete polygon number consists of nine digits. The first digit is an alias representing the subbasin (4^{th} level HUC or hydrologic unit code) in which a polygon occurs. The second and third digits represent the watershed (5^{th} level HUC), and the fourth and fifth digits represent the subwatershed (6^{th} level HUC). The last four digits are a unique number within each subwatershed, starting with

0001 and ending with 9999 (if necessary). The entire 9-digit number will be used when attributing polygons and entering data electronically.

2. *The following applies to the Umatilla National Forest only*. A complete polygon number consists of eight digits. The first digit is a Ranger District code (4 for Pomeroy), the next two digits refer to the year in which an aerial photograph was taken (01 for 2001), and the last five digits are a unique number starting with 00001 and ending with 99999 (if necessary). The entire 8-digit number will be used when attributing polygons and entering data electronically.
3. *The following applies to the Wallowa-Whitman National Forest only*. A complete polygon number consists of twelve digits. The first digit is a Ranger District code, the next 4 digits are a GEOLOC number (IH28, for example), the next digit is an 'N' or an 'S' designating the north or south half of a GEOLOC quad, the next two digits refer to the year in which an aerial photograph was taken, and the last four digits are a unique number starting with 0001 and ending with 9999 (if necessary). The entire 12-digit number will be used when attributing polygons and entering data electronically.
4. *For polygons that cross a HUC, Ranger District, or GEOLOC boundary***.** If greater than 50% of a polygon occurs in a particular Ranger District, that District number will be used when deriving a number for the polygon. The same protocol will be used when a polygon occurs in more than one HUC or on more than one GEOLOC map. HUC, GEOLOC or Ranger District boundaries will not create new polygons.

B. Data Source (Data_Source in EVG_Exam table). This field records the method by which the data was collected.

CODE	DESCRIPTION
PI	From photo interpretation
WT	From walk-through field examination

C. Existing Lifeform (Exist_Lifeform in EVG_Stand_Info table).

1. WATER TYPES (Water)

CODE	DESCRIPTION
WE	Estuary systems – interface between fresh and saline water
WL	Lake, pond, impoundment, non-moving water
WO	Oceans, seas, saline water bodies
WR	Running water – streams, creeks, rivers, ditches
WX	Other water

2. ADMINISTRATIVE OR AGRICULTURE TYPES (Nonvegetated land)

CODE	DESCRIPTION
AB	Buildings, structures, roads
AC	Cultivated land
AD	Dump for garbage, etc.
AG	Grassland, permanent pasture
AO	Orchards (seed orchards)
AR	Recreation areas, parks, play areas, golf courses
AX	Other administrative and agriculture

3. NONVEGETATED TYPES (Nonvegetated land)

CODE	DESCRIPTION
NC	Cinders, lava flow, mudflow, glacial outwash
NF	Floodplain periodically denuded of vegetation
NI	Ice fields, glaciers, ice caves
NL	Landform failure (natural slumps, avalanches)
NM	Mine tailings; dredge piles; other man-caused minimal vegetation potential
NR	Rocky land with minimal vegetation potential
NS	Sand with minimal vegetation, whether shoreline or interior
NT	Talus or scree land (rock slides) with minimal vegetation potential
NX	Other nonvegetated land

4. FORB TYPES (Nonforest land)

CODE	DESCRIPTION
FM	Moist forblands in the forest zone
FS	Subalpine forb fields, alpine forb fields
FW	Wet forblands, forb meadows
FX	Other forblands

5. GRASS TYPES (Nonforest land)

CODE	DESCRIPTION
GA	Annual grass vegetation
GB	Bunchgrass vegetation
GM	Moist grassland within the forest zone
GR	Rhizomatous grass or sedge vegetation
GS	Subalpine or alpine grassland
GX	Other grassland

6. MEADOW TYPES (Nonforest land)

CODE	DESCRIPTION
MD	Dry meadow (water table available part of the season)

MM Moist meadow (water table available all growing season)
MS Subalpine/alpine moist to wet meadows
MT Tule meadow (standing water most of all growing season)
MW Wet meadow (surface moist or wet all growing season)
MX Other meadow

7. SHRUB TYPES (Nonforest land)

CODE	DESCRIPTION
SC	Chaparral, evergreen shrubland, forest zone and non-forest
SD	Dry shrubland, sagebrush, non-forest zone shrubland
SM	Moist shrubland, forest zone shrubs and shrubland
SS	Alpine and subalpine shrubland
SW	Wet shrubland, shrub meadows
SX	Other shrubland

8. FOREST TYPES (Forest land)

CODE	DESCRIPTION
CA	Subalpine fir is predominant
CB	Whitebark pine is predominant
CD	Douglas-fir is predominant
CE	Engelmann spruce is predominant
CJ	Western juniper is predominant
CL	Lodgepole pine is predominant
CM	Mountain hemlock is predominant
CN	Coniferous nonstocked area (recently deforested areas such as wildfires, etc.)
CP	Ponderosa pine is predominant
CT	Western larch (tamarack) is predominant
CW	Grand fir is predominant
CX	Coniferous forest (no specific species predominance)
HC	Black cottonwood is predominant
HN	Hardwood nonstocked area (recently deforested areas such as wildfires, etc.)
HQ	Quaking aspen is predominant
HX	Hardwood forest (no specific species predominance)

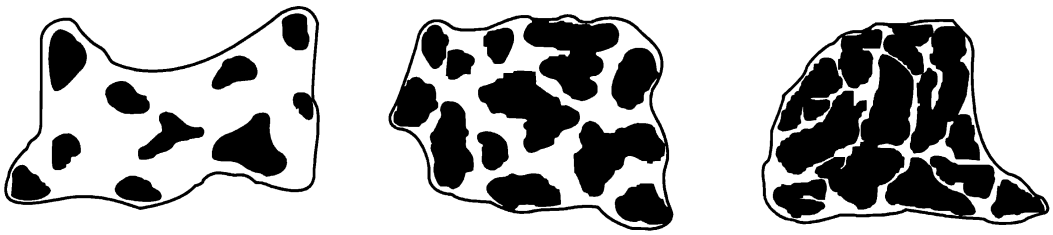
Note: The CX and HX codes should be used as a last resort and only when another C_ or H_ code is not applicable. A predominant tree species is one that comprises the majority (over 50%) or plurality of tree stocking within a forest polygon.

D. Clumpy (Clumpy in EVG_Stand_Info table). Clumpy is only evaluated for forest polygons. A clumpy condition exists for a forest polygon when the following conditions are met:

- Polygon has inclusions of less than 2 acres that differ from the rest of the polygon.
- Tree canopy cover of inclusions varies by 30% or more from the remainder of the polygon.
- In aggregate, inclusions comprise 20% or more of the total polygon area.

CODE	DESCRIPTION
N	No clumpiness; continuous, non-clumpy forest distribution
L	Low or widely scattered clump distribution (<30% of polygon area)
M	Moderate clump distribution (30-70% of polygon occupied by clumps)
H	High (dense) clump distribution (>70% of polygon occupied by clumps)

This diagram provides a representation of low, moderate, and high clumpiness.



E. Snags (Snag_GT21, Snag_12_21 and Snag_LT12 in EVG_Stand_Info table). Snags are evaluated for forest polygons only. This data item is the number of snags, recorded for three diameter (DBH) classes, for the total polygon.

FIELD	EXAMPLE CODING	DESCRIPTION
< 12"	015	15 snags in <12" dbh class occur in the polygon
12-21"	065	65 snags in 12-21" dbh class occur in the polygon
> 21"	109	109 snags in >21" dbh class occur in the polygon

F. Cover-tree (Cover_Tree in EVG_Stand_Info table). This is the total canopy cover of trees in a polygon. Cover-tree should be calculated and recorded to the nearest one percent, such as 47% or 59% (the percent symbol is not recorded on the PI Data Card). The sum of canopy cover values for all tree layers in a polygon (layers 1-3 are tree layers) should equal cover-tree.

G. Cover-nontree (Cover_Nontree in EVG_Stand_Info table). This is the total canopy cover of all nontree vegetation in a polygon, expressed as a percent such as 23% or 64% (the percent symbol is not recorded on the PI Data Card). Examples: if an entire polygon is vegetated and the tree layers (cover-tree) add up to 63%

cover, then cover-nontree should be coded as 37%; if 10% of a polygon is non-vegetated (rock outcrop), and if the tree layers (cover-tree) add up to 63% cover, then cover-nontree should be coded as 27%.

H. Hardwoods (Hardwood_Spp in EVG_Stand_Info table). For each vegetated polygon (nonforest and forest), note the presence of hardwood species using the following codes. Note: hardwood concentrations that exceed the minimum polygon size (1 acre for shrub hardwoods and 2 acres for tree hardwoods) should be delineated and classified as separate polygons.

CODE	DESCRIPTION
N	No hardwoods are apparent or visible in the stand
ALNUS	Alders
BETULA	Birches
MIXED	Mixed hardwood composition (more than one predominant species)
OTHER	Other hardwoods not listed here (dogwood, elder, maple, etc.)
POTR5	Quaking aspen
POBAT	Black cottonwood
PRUNUS	Cherries
SALIX	Willows

I. Hardwood Size Class (Hardwood_Size_Class in EVG_Stand_Info table). For each vegetated polygon (nonforest and forest) for which "hardwoods" was coded (e.g., any hardwoods code other than 'N' was used), note the predominant size class of the hardwoods using the following codes.

CODE	DESCRIPTION
3	Saplings, trees 1.0 to 4.9 inch DBH
5	Poles, trees 5.0 to 8.9 inch DBH
77	Small trees, 9.0 to 15.9 inches DBH
88	Small trees, 16.0 to 20.9 inches DBH
9	Medium trees, 21.0 to 31.9 inches DBH
11	Large trees, 32.0 to 47.9 inches DBH
13	Giant trees, 48.0 inches DBH or greater
99	Non-tree size hardwoods (hardwood shrubs not attaining tree size). A tree is defined as vegetation with a woody stem at least 3 inches in diameter (or 9.4 inches in circumference) at breast height (4½ feet above average ground level) and at least 13 feet tall.

J. Aerial Photo ID (Photo_ID in EVG_Vegetation table). For each polygon, information about the aerial photograph (project, roll, print) on which it occurs will be recorded. If the polygon occurs on more than one photograph, information

about the photograph on which the majority of the polygon occurs will be recorded.

III. LAYER INFORMATION.

A. Layer (Layer in EVG_Tree_Layer_Info table). This field designates the predominant vegetation lifeform in each layer. Each polygon can have no more than three layers coded. If more than three layers can be determined, then tree layers take precedence and are coded first. Layer codes are:

CODE	DESCRIPTION
1	Tree layer; in a multi-layered forest polygon, the tallest trees are coded as layer 1
2	Tree layer; in a multi-layered forest polygon, shorter trees are coded as layer 2
3	Tree layer; in a multi-layered forest polygon, the shortest trees are layer 3
4	Shrub layer; predominant species in the layer are shrubs **(EVG_Shrub_Layer_Info table)**
5	Herb layer; predominant species in the layer are herbs (grasses or forbs) **(EVG_Herb_Layer_Info table)**

Note: the following table shows various combinations in which layer fields can be coded.

	FIRST LAYER	SECOND LAYER	THIRD LAYER	COMMENT/INTERPRETATION
ONE LAYER POLYGONS	1			Trees only
	4			Shrubs only
	5			Herbs only
TWO LAYER POLYGONS	1	2		Trees only
	1	4		Trees and shrubs
	1	5		Trees and herbs
	4	5		Shrubs and herbs
THREE LAYER POLYGONS	1	2	3	Trees only
	1	2	4	Two tree layers plus shrubs
	1	2	5	Two tree layers plus herbs
	1	4	5	One tree layer, plus shrubs and herbs

B. Size Class (Size_Class_Local in EVG_Tree_Layer_Info table). The following size class codes pertain to tree layers only (layer codes 1, 2, or 3).

CODE	DESCRIPTION
1	Seedlings, trees > 6 " tall and < 1 " DBH, rooted in mineral soil
2	Seedlings and saplings mixed
3	Saplings, trees 1.0 to 4.9 inch DBH
4	Saplings and poles mixed
5	Poles, trees 5.0 to 8.9 inch DBH
6	Poles and small trees mixed
77	Small trees, 9.0 to 15.9 inches DBH
88	Small trees, 16.0 to 20.9 inches DBH
8	Small trees and medium trees mixed
9	Medium trees, 21.0 to 31.9 inches DBH
10	Medium trees and large trees mixed
11	Large trees, 32.0 to 47.9 inches DBH
12	Large trees and giant trees mixed
13	Giant trees, 48.0 inches DBH or greater

C. Canopy Cover (Cover_Canopy in EVG_Tree_Layer_Info table; Cover_Shrub in EVG_Shrub_Layer_Info table; Cover_Herb in EVG_Herb_Layer_Info table). This is the total canopy cover of a particular layer, regardless of which lifeform (tree, shrub, herb) is predominant.

D. Polygon and Layer Coding Examples.

1. *Nonvegetated polygons* (including water); applicable lifeform codes begin with W, A, or N.
   Only these polygon fields are coded: polygon number, lifeform, and data source. No layer information is recorded for these polygons.
2. *Nonforest polygons*; applicable lifeform codes begin with F, G, M, or S.
   All polygon fields except 'clumpy' and 'snags' are coded.
   Possible layer combinations (1, 4, 5) may or may not be present.
   Layer 1 (trees) will always be recorded first if cover-tree is coded as 1% or more.
   Layer 4 (shrub) is coded when shrub canopy cover is present.
   Layer 5 (herb) is coded when herb canopy cover is present.
3. *Nonstocked forest polygons* recently deforested by wildfire, timber harvest, or another disturbance process. Applicable polygons are those with lifeform code CN or HN, cover-tree is 10% or less, one tree layer only, and any applicable size class code.
   All polygon fields are coded.

Possible layer combinations (1, 4, 5) may or may not be present.
Layer 1 (trees) will always be recorded first if cover-tree is coded as 1% or more.
Layer 4 (shrub) is coded when shrub canopy cover is present.
Layer 5 (herb) is coded when herb canopy cover is present.

4. *Stocked forest polygons* where seedlings or saplings comprise the tallest tree layer. Applicable polygons are those with lifeform codes C_ or H_, cover-tree is 10% or more, and one tree layer only with a size class code of 1, 2 or 3 (seedlings/saplings).
   All polygon fields are coded.
   Possible layer combinations (1, 4, 5) may or may not be present.
   Layer 1 (trees) must be recorded; other tree layers (2, 3) are not permissible.
   Layer 4 (shrub) is coded when shrub canopy cover is present.
   Layer 5 (herb) is coded when herb canopy cover is present.
5. *Stocked forest polygons* where poles comprise the tallest tree layer. Applicable polygons are those with lifeform codes C_ or H_, cover-tree is 10% or more, and the size class code for layer 1 is 4 or 5 (poles).
   All polygon fields are coded.
   Tree layers possible: 1 or 2.
   When a mix of tree heights is present, assign trees to layers using this protocol:
   - The first layer is defined as those trees comprising 51 to 100% of the average maximum height of the tree stand.
   - The second layer is defined as those trees comprising 1 to 50% of the average maximum height of the tree stand.

   A second tree layer can be coded when trees of the defined height range comprise 5% or more canopy cover.
   Note: Layer 4 (shrub) or 5 (herbs) can be coded when shrub or herb canopy cover is present; however, no more than three layers may be recorded, including tree layers.
6. *Stocked forest polygons* where small, medium or large trees comprise the tallest tree layer. Applicable polygons are those with lifeform codes H_ or C_, cover-tree is 10% or more, and the size class code for layer 1 is 6-13, 77 or 88 (small, medium, and large trees).
   All polygon fields are coded.
   Tree layers possible: 1, 2 or 3.
   When a mix of tree heights is present, assign trees to layers using this protocol:

- The first layer is defined as those trees comprising 71 to 100% of the average maximum height of the tree stand.
- The second layer is defined as those trees comprising 41 to 70% of the average maximum height of the tree stand.
- The third layer is defined as those trees comprising 1 to 40% of the average maximum height of the tree stand.

A second or third tree layer can be coded when trees of the defined height range comprise 5% or more canopy cover.

Note: Layer 4 (shrub) or 5 (herbs) can be coded when shrub or herb canopy cover is present; however, no more than three layers may be recorded, including tree layers.

E. Plant Species (Spp in EVG_Trees_Info, EVG_Shrubs_Info and EVG_Herbs_Info tables; Entry_Order in EVG_Trees_Info, EVG_Shrubs_Info and EVG_Herbs_Info tables).

Whenever a layer is coded on the PI Data Card, the plant species occurring in the layer must also be recorded. Up to three species can be recorded for each layer; species are coded in decreasing order of predominance. The most predominant species is coded '1' in Entry_Order, the next most predominant species is coded '2', and the third most predominant is coded '3'.

Valid plant species codes are based on the U.S. Department of Agriculture PLANTS database (see http://plants.usda.gov); valid code lists will be provided for each project or contract.

APPENDIX: SILVICULTURE WHITE PAPERS

White papers are internal reports, and they are produced with a consistent formatting and numbering scheme – all papers dealing with Silviculture, for example, are placed in a silviculture series (Silv) and numbered sequentially. Generally, white papers receive only limited review and, in some instances pertaining to highly technical or narrowly focused topics, the papers may receive no technical peer review at all. For papers that receive no review, the viewpoints and perspectives expressed in the paper are those of the author only, and do not necessarily represent agency positions of the Umatilla National Forest or the USDA Forest Service.

Large or important papers, such as two papers discussing active management considerations for dry and moist forests (white papers Silv-4 and Silv-7, respectively), receive extensive review comparable to what would occur for a research station general technical report (but they don't receive blind peer review, a process often used for journal articles).

White papers are designed to address a variety of objectives:

(1) They guide how a methodology, model, or procedure is used by practitioners on the Umatilla National Forest (to ensure consistency from one unit, or project, to another).

(2) Papers are often prepared to address ongoing and recurring needs; some papers have existed for more than 20 years and still receive high use, indicating that the need (or issue) has long standing – an example is white paper #1 describing the Forest's big-tree program, which has operated continuously for 25 years.

(3) Papers are sometimes prepared to address emerging or controversial issues, such as management of moist forests, elk thermal cover, or aspen forest in the Blue Mountains. These papers help establish a foundation of relevant literature, concepts, and principles that continuously evolve as an issue matures, and hence they may experience many iterations through time. [But also note that some papers have not changed since their initial development, in which case they reflect historical concepts or procedures.]

(4) Papers synthesize science viewed as particularly relevant to geographical and management contexts for the Umatilla National Forest. This is considered to be the Forest's self-selected 'best available science' (BAS), realizing that non-agency commenters would generally have a different conception of what constitutes BAS – like beauty, BAS is in the eye of the beholder.

(5) The objective of some papers is to locate and summarize the science germane to a particular topic or issue, including obscure sources such as master's theses or Ph.D. dissertations. In other instances, a paper may be designed to wade through an overwhelming amount of published science (dry-forest management), and then synthesize sources viewed as being most relevant to a local context.

(6) White papers function as a citable literature source for methodologies, models, and procedures used during environmental analysis – by citing a white paper, specialist reports can include less verbiage describing analytical databases, techniques, and so forth, some of which change little (if at all) from one planning effort to another.

(7) White papers are often used to describe how a map, database, or other product was developed. In this situation, the white paper functions as a 'user's guide' for the new product. Examples include papers dealing with historical products: (a) historical fire extents for the Tu-

cannon watershed (WP Silv-21); (b) an 1880s map developed from General Land Office survey notes (WP Silv-41); and (c) a description of historical mapping sources (24 separate items) available from the Forest's history website (WP Silv-23).

The following papers are available from the Forest's website: Silviculture White Papers

Paper #	Title
1	Big tree program
2	Description of composite vegetation database
3	Range of variation recommendations for dry, moist, and cold forests
4	Active management of dry forests in the Blue Mountains: silvicultural considerations
5	Site productivity estimates for upland forest plant associations of the Blue and Ochoco Mountains
6	Fire regimes of the Blue Mountains
7	Active management of moist forests in the Blue Mountains: silvicultural considerations
8	Keys for identifying forest series and plant associations of the Blue and Ochoco Mountains
9	Is elk thermal cover ecologically sustainable?
10	A stage is a stage is a stage…or is it? Successional stages, structural stages, seral stages
11	Blue Mountains vegetation chronology
12	Calculated values of basal area and board-foot timber volume for existing (known) values of canopy cover
13	Created opening, minimum stocking level, and reforestation standards from the Umatilla National Forest land and resource management plan
14	Description of EVG-PI database
15	Determining green-tree replacements for snags: a process paper
16	Douglas-fir tussock moth: a briefing paper
17	Fact sheet: Forest Service trust funds
18	Fire regime condition class queries
19	Forest health notes for an Interior Columbia Basin Ecosystem Management Project field trip on July 30, 1998 (handout)
20	Height-diameter equations for tree species of the Blue and Wallowa Mountains
21	Historical fires in the headwaters portion of the Tucannon River watershed
22	Range of variation recommendations for insect and disease susceptibility
23	Historical vegetation mapping
24	How to measure a big tree
25	Important insects and diseases of the Blue Mountains
26	Is this stand overstocked? An environmental education activity
27	Mechanized timber harvest: some ecosystem management considerations
28	Common plants of the south-central Blue Mountains (Malheur National Forest)
29	Potential natural vegetation of the Umatilla National Forest
30	Potential vegetation mapping chronology

Paper #	Title
31	Probability of tree mortality as related to fire-caused crown scorch
32	Review of the "Integrated scientific assessment for ecosystem management in the interior Columbia basin, and portions of the Klamath and Great basins" – forest vegetation
33	Silviculture facts
34	Silvicultural activities: description and terminology
35	Site potential tree height estimates for the Pomeroy and Walla Walla ranger districts
36	Tree density protocol for mid-scale assessments
37	Tree density thresholds as related to crown-fire susceptibility
38	Umatilla National Forest Land and Resource Management Plan: forestry direction
39	Updates of maximum stand density index and site index for the Blue Mountains variant of the Forest Vegetation Simulator
40	Competing vegetation analysis for the southern portion of the Tower Fire area
41	Using General Land Office survey notes to characterize historical vegetation conditions for the Umatilla National Forest
42	Life history traits for common conifer trees of the Blue Mountains
43	Timber volume reductions associated with green-tree snag replacements
44	Density management field exercise
45	Climate change and carbon sequestration: vegetation management considerations
46	The Knutson-Vandenberg (K-V) program
47	Active management of quaking aspen plant communities in the northern Blue Mountains: regeneration ecology and silvicultural considerations
48	The Tower Fire…then and now. Using camera points to monitor postfire recovery
49	How to prepare a silvicultural prescription for uneven-aged management
50	Stand density conditions for the Umatilla National Forest: a range of variation analysis
51	Restoration opportunities for upland forest environments of the Umatilla National Forest
52	New perspectives in riparian management: Why might we want to consider active management for certain portions of riparian habitat conservation areas?
53	Eastside Screens chronology
54	Using mathematics in forestry: an environmental education activity
55	Silviculture certification: tips, tools, and trip-ups
56	Vegetation polygon mapping and classification standards: Malheur, Umatilla, and Wallowa-Whitman national forests
57	The state of vegetation databases on the Malheur, Umatilla, and Wallowa-Whitman national forests

REVISION HISTORY

September 2002: The first version of this white paper was prepared in early 2001. It was revised in August 2001, June 2002, and July 2002 by a vegetation classification work group consisting of representatives from all three of the Blue Mountains national forests.

March 2014: This revision implemented the new white-paper template format, and minor formatting and editing changes were made throughout the document.